Injection moulding device

The present invention relates to an injection mould device comprising two parts that can move with respect to one another for delimiting a mould cavity between them, wherein at least one of said parts is provided with a plastic feed that can be shut off, at least one of said parts, the stationary part, is joined to a frame and the other, movable part can be moved with respect to said frame by means of operating means. An injection moulding device of this type is generally known in the art and is used for injection moulding a wide variety of plastic articles. By way of example the injection moulding of disc-shaped information carriers, such as DVDs and CDs, may be mentioned in this context, but it must be understood that the invention is in no way restricted to this.

In conventional injection moulding devices a heavy frame that generally extends horizontally is used, to one side of which the fixed mould section is joined, which in general is also provided with the plastic feed. The movable mould section is mounted via a particularly heavy construction such that it is able to slide with respect to the frame. Such a construction must be relatively heavy because no significant movement between the mould sections may take place even under the high closing forces that are required when injecting. Because increasingly more stringent requirements are imposed on the accuracy of the injection, increasingly more stringent requirements are imposed on the rigidity of the construction. As a result the costs of the injection moulding devices are increasing more and more. Moreover, in view of the construction of conventional injection moulding devices it is generally customary to set these up horizontally, as a result of which they take up a relatively large amount of space.

The aim of the present invention is to provide an injection moulding device that can be of more lightweight, more compact construction and can be produced less expensively, it nevertheless being ensured that the particularly stringent tolerances imposed on injection moulding are met. This applies, for example, for injection moulding DVDs, where particularly stringent requirements are imposed with respect to the mutual position of the mould sections.

This aim is achieved with an injection moulding device as above, in that the joint between said movable part and said operating means allows movement of said movable part with respect to said operating means in a direction that is not the direction of movement of the operating means, and in that centring means are fitted for centring the

movable part with respect to the stationary part when the stationary part and the movable part move towards one another.

According to the invention there is no longer a rigid joint between the movable mould section and the operating means therefor. Moreover, centring means are provided for centring the movable mould section with respect to the stationary mould section. As a result it is no longer necessary to make the frame of the injection moulding device and the construction of the operating means such that they have flexural stiffness. After all, the (slight) deformation that occurs when the mould is closed can be taken up by the non-rigid joint between the operating means and the movable mould section when the movable mould section and the stationary mould section become centred with respect to one another.

As a result the frame and associated structural parts can be of appreciably simpler construction. The costs will decrease as a result. Moreover, it is now possible in a simple manner to allow the device to operate vertically, that is to say to construct it with a vertical closing movement of the movable mould section. In certain cases this has advantages when changing mould sections for injecting other products (centring with respect to the seating therefor) and when removing products after injection.

The non-rigid joint between the operating means and the movable mould section can comprise any joint known in the art. This joint has to be rigid only in the direction of closing. A spherical bearing is mentioned by way of example. Optionally this can be constructed as an assembly with a ball both close to the mould section and to the operating means, a dual cup being placed between them. In this way a dual pivot bearing is formed that allows tilting and slight movement in the horizontal plane (in the case of a vertical closing movement) of the movable mould section with negligible friction.

Another example of such a non-rigid joint is a number of columns extending in the direction of movement. These columns are arranged between the operating means and the movable part. The columns are rigid (to pressure) in the longitudinal direction, that is to say in the direction of movement, and weak in the transverse direction. The weakness can be achieved by making recesses, such as grooves, in the columns. By fitting a number of columns next to one another parallel with respect to one another, mutual movement of the bottom joint face with respect to the top joint face is possible but, because of the presence of the columns, this movement is purely parallel, that is to say a sort of parallelogram construction is obtained. It has been found that if a larger number of columns is used the

Claims

1. Injection moulding device (1) comprising two parts (22, 27) that can move with respect to one another for delimiting a mould cavity between them, wherein at least one of said parts (22) is provided with a plastic feed (19) that can be shut off, at least one of said parts, the stationary part (22), is joined to a frame (2) and the other, movable part (27) can be moved with respect to said frame by means of operating means (5-13), characterised in that the joint between said movable part and said operating means allows movement of said movable part with respect to said operating means in a direction that is not the direction of movement of the operating means, and in that centring means (25, 30) are fitted for centring the movable part with respect to the stationary part when the stationary part and the movable part move towards one another.

2. Injection moulding device according to Claim 1, wherein said joint comprises a ball/cup assembly, the axis of which essentially corresponds to the direction of movement of the movable part.

3. Injection moulding device according to one of the preceding claims, wherein said joint comprises a number of columns (55) which extend in the direction of movement and are arranged between the operating means and said movable part, which columns are rigid in the longitudinal direction thereof and are weak in the transverse direction thereof.

4. Injection moulding device according to one of the preceding claims, wherein said joint comprises two discs (56-58) located some distance apart one after the another in the direction of movement, joined by a rib (59; 60) extending essentially perpendicularly to said direction of movement.

5. Injection moulding device according to Claims 3 and 4, wherein said discs located some distance apart are fitted adjoining said movable part.

6. Injection moulding device according to one of the preceding claims, wherein said centring means comprise interacting centring ridges/centring recesses, either said centring ridges or said centring recesses being arranged on the boundary surface of the stationary

part, or said centring recesses or said centring ridges being arranged on the boundary surface of the movable part.

7. Injection moulding device according to Claim 6, comprising centring ridges/centring recesses that are radial with respect to the closing movement.

8. Injection moulding device according to one of the preceding claims, wherein said centring means comprise interacting centring rollers/centring recesses, said centring recesses being made in both the stationary part and the movable part and said rollers being accommodated in said centring recesses.

9. Injection moulding device according to Claim 8, wherein said centring recesses comprise annular grooves.

10. Injection moulding device according to one of the preceding claims, wherein said operating means comprise an element engaging the movable part, provided with a ball-like surface engaging in a cup of a ring (17) that is cup-shaped on either side, the movable part being provided with a cup-shaped part (18) engaging in the other cup of said ring.

11. Injection moulding device according to one of the preceding claims, wherein said operating means comprise an element engaging the movable part that is guided as piston (14) in a cylinder (12) joined to said frame.

12. Injection moulding device according to one of the preceding claims, wherein said operating means comprise a crankshaft (5)/connecting rod (6) mechanism.

13. Injection moulding device according to one of the preceding claims, wherein said operating means are designed to provide a first opening position for removing said injected articles and a second, further opened position for maintenance and/or changing mould sections.

14. Injection moulding device according to one of the preceding claims, wherein the mould cavity is provided around the periphery, that is to say in a direction parallel to the

closing movement of said parts, with a closing ring (31), which, under spring pressure (32), can move with respect to the part around which it is fitted, such that after said closing ring (31) has engaged on the opposite part said parts (22, 27) are able to centre with respect to one another.

15. Injection moulding device according to Claim 14, wherein said closing ring (41) is constructed as a venting ring.

16. Injection moulding device according to one of the preceding claims, wherein at least one of said movable parts is provided with cooling/heating channels.

17. Injection moulding device according to one of the preceding claims, designed for the injection of one or more disc-shaped information carriers.